

Super-Typhoon Pongsona; Damage Assessment Report War In The Pacific (WAPA), National Historical Park Asan, Guam

Executive Summary

On Sunday, December 8, 2002, Guam was scheduled to observe Our Lady of Camarin Day, the island's patron saint. Instead, after developing for five days, Super-Typhoon Pongsona struck the Island of Guam. This storm had intensified as it tracked some 1,200 miles towards the Mariana Islands (see attached map), generating sustained winds of 150 mph with gusts exceeding 180 mph, depending on location. Storm surge and wave run-up also caused extensive damage along the shoreline. The combination of winds and waves created damage of such a magnitude that this typhoon has been labeled as the worst storm to hit Guam in living memory, a century storm.

The War in the Pacific (WAPA), National Historical Park (Site Map attached) had received extensive damage from this super-typhoon (see attached NPS damage report). Facilities along the shoreline, particularly the Haloda Building housing the Park Headquarters, World War II museum and Visitor's Center, and the Asan Beach Unit, were heavily damaged by wave action. The Haloda Building is currently vacated and re-occupation is not recommended due to various problems as described in this report. The Asan Beach will require re-establishment of shoreline embankment, parking lot repaving and possibly stone revetment repairs. Fortunately this park did not contain buildings or structures near the surf zone although the repairs that are identified may be costly. Other park units including the Maintenance facility, Piti Guns, Asan Overlook, Ga'an Point, Apaca Point, and Fonte Plateau suffered mostly from wind and rain damage.

The USDOI National Park Service contracted with Engineering Solutions, Inc. (ESI), to perform an assessment of the typhoon damages to the WAPA park facilities and develop a cost estimate for repairs. The Guam based team of Winzler & Kelly Consulting Engineers, under subcontract to ESI, mobilized on site and assessed park damage on December 19, 2002. A preliminary assessment report (without costs) was transmitted to NPS on December 31, 2002. A pre-final report was transmitted on January 20, 2003. The draft final assessment report contained herein is based in part on NPS review comments and is due for submission by March 01, 2003.

A detailed description of the damages, representative photographs and cost estimates are included in this report. The total cost of typhoon damage repairs for the entire WAPA site is estimated to be in excess of \$1,421,600.

Background

On Thursday December 19, 2002 the Winzler & Kelly team made a field inspection of three facilities operated by the National Park Service on Guam (see location and site map). These facilities had suffered varying degrees of damage from Super-Typhoon Pongsona, on Sunday December 8, 2002 (a typhoon tracking map is attached). This assessment was performed to document the extent of damages incurred and includes cost estimates for the repairs. Also, at that time, representative photographs of the damage were provided by the NPS and are included as an appendix to this report.

The W&K team consisted of the following personnel: Fred A. Smith, Asia-Pacific Region Manager; Andrew W. Smith, Civil Engineer; John Setiadi, Architect; Conrado Vales, Mechanical Engineer; and Wayne Wixon, Electrical Engineer. The team was accompanied by the WAPA Park Superintendent, Eric J. Brunnemann; the WAPA maintenance worker, Jim Powell; WAPA Museum Curator, Terry Duchesne; and Bill Vines from NPS Hawaii.

The facilities that were inspected on December 19th consist of the Haloda Building which contains the WAPA Park Headquarters, the museum collection and the T. Stell Newman Visitor Center; and the Asan Point Maintenance Complex and Comfort Station area including the park grounds. On Friday December 27th Park Superintendent Brunnemann and Andrew Smith made site inspections to the park facilities at Ga'an Point and Apaca Point. On January 02, 2003 these two individuals also inspected the Asan Bay Overlook and Fonte Plateau site.

Damage Assessment Summary

The *Haloda Building* received extensive non-structural damage from wave run-up due to its proximity on the beach. One building column was noted to have a crack that apparently penetrates completely through the concrete, but this is not considered to be serious damage to the building's structural concrete frame. The building's main electrical service and distribution panels in the lower level parking garage were heavily damaged by wave surge. The government owned electrical equipment was removed by NPS personnel after the site inspection. The Visitor Center's exhibits and NPS offices were also badly damaged by wind driven rain intruding through broken windows and afterward because of no power to de-humidify and dry out interior moisture. All NPS property has been removed from the building (see attached newspaper article), however, the cost of boxing, moving and storage for these items, building security and other costs related to storm damage that have been incurred directly by the Park Service are not included here. Mold, mildew and fungus in the building are issues raised later in this report.

The asphalt parking lot that is adjacent to the Haloda building was completely obliterated by wave run-up washing out the pavement. The pavement and base course is gone up to the roadway, leaving only beach sand. This area is Park property that cannot be used.

The *Asan Point Maintenance Complex* received relatively light damage from the 180 mph winds. A side door blew in and water penetrated into ceiling mounted light fixtures with some wind and water damage inside the maintenance office and storage area. The roof vents (3 each) were blown off, and the building air conditioner was damaged. A 20 feet long office trailer was blown off its concrete pedestals damaging its utility services. Six vehicles parked in the maintenance complex received varying degrees of damage. The perimeter chain link fence (8 feet high) was partially knocked down (150 feet) and the 15 foot long sliding gates damaged.

The *Asan Beach Comfort Station* did not appear to receive any significant damage but the sewage lift station pumps will need replacing. These 4-inch grinder pumps were filled with saltwater and do not work. The adjacent park had extensive wind and wave damage. Approximately 200 coconut trees were killed when their tops snapped off. The asphalt parking lot was torn up, a section of concrete paved walkway (12 feet wide by 30 feet long) washed out and hundreds of cubic yards of sand and coral washed up onto the grass. This material came from embankment along the shoreline (at the edge of the sandy beach area) that's approximately 1,000 feet long, 10 feet wide and 4 feet deep, with a total volume of 1,480 cubic yards to be reinstated. A slope stabilization project along the shoreline may consist of placing stone rip-rap over a geotextile material for 1,000 feet along the embankment.

The *Ga'an Point* and *Apaca Point* facilities being smaller and with a different exposure than Asan (westerly vs. northerly) had received relatively less damage. Work at these two units involves mostly the clean-up of debris, minor repairs, and replacement of vegetation. This is similar for the *Asan Point Overlook*, and *Fonte Plateau*.

The *Piti Guns* had considerable damage from downed trees and debris. The fallen trees had damaged sections of the stair railing. One of the three guns had been moved off of its platform by the wind and needs to be reset.

Detailed Damage Description

The following detailed description of damage at each facility is based on the preliminary assessment field observations, follow-up site visits and discussions with the park staff.

Haloda Bldg.; Park HQ and Visitor Center:

Mechanical; Two (2) air cooled condensing units need replacement with panel covers blown away exposing electrical power and control systems, condenser fins are corroded beyond repair. Two downspouts from roof drains located in basement were severed near the floor that contributed to water flooding in the lower level garage. The air-handling unit inside the mechanical room appears to be functional but does not meet building code clearance requirements. At the ground floor toilet, one exhaust register is missing, water is dripping around exhaust duct. Dripping water is apparently from the second floor that had water accumulation during the typhoon.

Electrical; Remove and relocate building electrical service and distribution panels from existing lower level main feed. Basement is unsafe location for building power and stand-by generator due to storm surge and wave inundation. A cost for a new electrical building is included with the civil/structural works estimate.

Structural; One exterior column (NW corner) by driveway to basement is cracked above the first floor beam connection. This crack is entirely through the column and is visible from the building's front and back. The crack does not appear to be serious or affect the structural integrity of the concrete frame at that location. Repairs may consist of applying an injected epoxy grout to seal the crack. However, there may be a future problem with this condition because salt air can penetrate and start corrosion in the reinforcing steel that will develop into concrete spalling on the column as the rebar rusts and expands.

In basement/parking level there are many concrete spalls in walls since rusted rebar has insufficient concrete cover. On the same level, column edges have rusted angle iron on all four corners. A non-bearing concrete block wall (approx.7ft. high and 20 ft. long), protecting electrical service panels, was knocked over from the wave surge into basement/parking level.

Civil; The lower level/basement drainage system is inadequate, clogged with sand and undersized for the stormwater flow entering the basement parking level. Adjacent asphalt parking lot (60 ft. x 160 ft.) is completely destroyed by wave action up to entrance and exit driveways connected with the main roadway, Route 1.

If the decision is made to restore and reoccupy the Haloda Building, then a shore protection structure (approx. 200 to 250 feet long) should be constructed. This seawall should prevent damage from minor storms to the parking lot and basement level. However, damage may still occur from waves generated by super-typhoons similar in magnitude to Pongsona.

Architectural; Canopy above roof access door damaged. Exterior canopy on ground floor at ocean side lanai damaged. Broken exterior ceiling/soffit at basement level, at ground floor, and

above second floor windows. Interior water damage such as wet carpet, water trapped above ceiling, inside light fixtures and file cabinets. Corrosion is apparent on metal surfaces from salt water spray during typhoon. Mold and fungus is growing on interior surfaces, especially ceiling and lower walls; wet and smelly carpet from mildew. There were many broken or damaged doors and windows, both exterior and interior, due to wind pressure and water. Debris on exterior building surfaces, paint peeling and bubbling.

Asan Maintenance Complex:

Mechanical; Three (3) roof ventilators were blown away or damaged and will require replacement. The building's air conditioning system (4 ton unit) was inspected by Carrier, on Jan. 02, 2003 and they recommend replacement of the compressor and voltage monitor. Trailer office moved by wind with damage to plumbing waste and water piping.

Electrical; Main building ceiling fluorescent light fixtures had water intrusion, need to clean, dry out and test system. Fuel equipment room electrical ventilator system is non-operational. The electrical post with meter was blown down cracking the PVC conduit. Trailer office moved with damage to weather head and electrical supply panel, needs replacement (220 volt, single phase). The building's security alarm system is inoperable

Structural; Damage to main building covered under architectural, no serious structural damage observed. Office trailer blown off concrete block pedestals, this has been realigned but it needs a new foundation and tie-down system.

Civil; Straighten about 150 linear feet of 8 foot high chain link fence. Replace 15 foot long sliding gate damaged by wind, realign main sliding gate (15 ft.) Patch asphalt access road 20 ft. by 10 ft.

Architectural; Water leak through mortar joints of glass blocks. Minor damage to roll-up service doors (5 each). Broken roofing membrane, wet insulation boards, broken flashing and reglets. Wind blew in the exterior side door breaking the door handle locks and blew open the interior steel door also breaking the locks to the fuel equipment room. Wind uplifted a portion of woodframe and plywood mezzanine floor.

Asan Point Beach Unit:

Mechanical; No apparent damage to comfort station, but new (2 each, 4-inch grinder) pumps may be required for sewage lift station since they can freeze up after inundation by salt water.

Electrical; Exterior lights for flag poles (2 each) and 50th Marine Monument (6 each) destroyed by wave action and needs replacement (8 total with conduit and conductor cable).

Structural; The stone veneer (marble) on the 50th Marine monument is stained, chipped and discolored. Bronze plaques on monument and placed in sidewalk need to be examined by conservator familiar with restoring this material after salt water damage. Monuments along beach-side are damaged and one is missing a plaque. Two metal flagpoles (25 ft. tall) need to be sanded and painted.

Civil; Entrance gate (metal square rods/tubes, 3ft. x 20ft. swing leafs) has one side broken off at hinges and second connection, needs to be repaired. Concrete bollards need repainting (400). Display bomb blown off concrete pedestal, reset. Concrete wheel stops thrown around lawn but not damaged, reset 50 each, after parking lot repaving. Park furniture damaged consists of 4 broken recycled plastic benches, 4 recycled plastic tables, 5-BBQ stands (steel fire box on round tube post), kids benches, slabs and signs (2'x 2', 2-each missing & 4'x 6', 2-each missing).

Concrete walk, 12 ft. wide by 30 ft. long, at Asan Point washed out by wave surge. Asphalt parking lot pavement (6,910 sy) destroyed by wave action. Asphalt walkway covered by sand and coral washed up onto the grass. This material came from embankment along the shoreline (at the edge of the sandy beach area) which is approximately 1,000 feet long, 10 feet wide and 4 feet deep, with a total volume of 1,480 cubic yards to be reinstated.

Coconut trees heavily damaged; approx. 20 percent or 200 with broken tops and will probably die; 10 were uprooted; about half (570) show salt spray/wind burn.

A rock revetment barrier for the inner reef flat (4ft. to 6ft. depths) consisting of a 10 foot wide "L" shaped jetty (200 feet) and breakwater (100 feet) that had been constructed by the US Navy was damaged by wave action. This man-made structure is a feature of the NHP invasion beach (3rd Marine Division) and is integral to the experience of returning war veterans and visitors to the park. The large (2-ton to 5-ton stone/rock) rip-rap has unraveled and should be reset to its original positions. Failure to complete this restoration will allow tidal action to cause major deterioration of the beach area the revetment is supposed to protect.

Architectural; No apparent damage to comfort station. However, the cost estimate for repairs at this location under this item will consist of cleaning and restoration for storm damage to the monuments and memorial plaques.

Apaca Point Beach Park:

- Debris washed up on site needs clearing.
- Wood picnic bench and shade structure damaged and needs replacement.
- Drainage around picnic benches (open channel) is undersized.
- Large metal park sign (36" x 60", brown with white letters) damaged by debris, second sign missing, need to replace.
- Repaint concrete bollards (50 each).
- Discoloring of all cement surfaces, HC parking stalls, walks, benches, tables; requires cleaning by pressure washing.

Ga'an Point Beach Park:

- Debris washed up on site needs clearing.
- Wood picnic bench and shade structure damaged and needs replacement.
- Drainage ditch 20 ft. wide and approx. 200 ft. long needs cleanout to remove debris.
- Two descriptive signs with posts bent.
- Three aluminum flagpoles (25 ft. high) bent approx. 15 degrees out of plumb.
- Six (6) feet wide asphalt walk damaged about 500 feet long.
- One broken concrete bollard, the rest need repainting (100 each).
- Replace crushed coral driveway entrance/exit (10 ft. wide by 30 ft. long by 2 each).

Piti Guns:

- Stairway up to gun emplacement and entire trail blocked by downed trees and debris (Gun # 3 has downed tree lying on top of it).
- Need to reposition one (1) gun moved off of the pedestal by wind (Gun # 2).
- Repaint all exposed metal surfaces, paint pealed off by wind (Gun #1, all paint on the barrel is gone).
- Bent hand rail caused by fallen Philippine mahogany tree.
- Replace damaged hand rail on stairs.

Asan Point Overlook:

- NPS logo (wood arrowhead) attached to concrete sign was blown off but retrieved.
- Stop sign and post (2 each) at entrance/exit missing.
- Gate looks okay but locked.
- Wooden spacer blocks for metal beam guardrail are extensively damaged (80 pieces), replace with metal square tube spacers.
- In parking lot, 3 each handicap parking signs and posts missing.
- Debris from earth berms washed onto sidewalk.
- One (1) way-side exhibit sign broken off from top of legs, (24" x 36" laminated plexiglass with 2-inch square metal tube frame.
- Five bronze plaques damaged by salt spray and flying debris, needs refinish by experienced conservator.
- Bronze name plaques 12" x 48" (approx 40 each) damaged by salt spray and flying debris, needs refinish by experienced conservator.
- Minor structural damage to top blocks of retaining walls.
- Plants (shrubs and trees) damaged by wind and salt spray (salt burn).
- Drainage point constructed of concrete and rock upended and blown about 6 ft at edge of cliff line (approx. 4 ft x 6 ft diameter).

Fonte Plateau:

- Concrete bollards with cable rope very slack (need 10 more bollards).
- Wheel stops ok but need 20 more and pave the parking area (60'x 100').
- Bunker needs to be secured (pad lock) and debris cleaned out/repaint.

Vehicles

US GOV License Plate	Description	<u>Damage</u>
*1 100 =0		
I148978	White Ford Pass Van	Side door window (x2)
I133301	John Deere 970 tractor	Front chassis cover (x2)
I33753	Dump truck 5 cubic yard box	Hydraulics tail gate
I149139	Case 580K backhoe	Lt. Door and Rt. Window
I133302	J.Deere 5400 tractor mower	Lt. Side cutter outrigger
I209707	Dodge Ram 3500 Flatbed	Hood & roof paint stripped And damage to lift gate
		<i>5 5</i>

Additional Observations

- 1. The Haloda building sustained extensive exterior and interior damage that can be repaired but due to building and site limitations, such as; proximity to the main road, location on the beach, potential security breaches, collection storage and display problems and ADA compliance issues (one of which is no elevator), one may question repair costs versus replacement price for a new facility in meeting the needs of the National Park Service and its visitors.
- 2. There should be a separate climate control system to reduce humidity in the museum for both public and storage spaces. The building's interior also has a build up of mold, mildew, and fungus as a consequence of storm damage. This requires all interior finishing (drop ceiling, gypsum board walls, and carpeting) to be removed and replaced. Cleaning (possibly replacing the ventilation ducts) and drying out the building are required before the interior is re-finished.
- 3. New doors and windows are needed to be impact resistant laminated glazing and frames capable to withstand 200 mph wind loads. Replace weather strips and install typhoon shutters.
- 4. Concrete roofing shall have a liquid elastomeric membrane applied with insulation applied directly under roof slab.
- 5. The stand-by generator is required at the Haloda building to maintain humidity and temperature control for the collection but the basement location for this equipment and the main electrical service will be continuously subject to wave inundation and salt spray. Recommend a separate electrical/generator building away from the beach.
- 6. NPS employees are now working in a 20 foot office trailer that has no telephone service or internet connection. There is currently only one land line connection located at the Maintenance Facility serving the entire park and staff that provides telephone and facsimile service.
- 7. At the Maintenance Facility the existing above ground fuel tanks are undersized to supply all of the park's vehicles and equipment for an extended period of time. After Super-Typhoon Pongsona, retail fuel deliveries on Guam were suspended for about two weeks because of a fire that destroyed three bulk storage tanks at the Mobil storage facility. This condition could be repeated in future disasters (typhoons, earthquake or terrorist action) and it directly affects Park operations. There should be a minimum storage volume of 1,000 gallons of diesel and 3,000 gallons of unleaded gasoline at the maintenance facility.

Cost Estimate of Repairs

The following cost estimates for repairs are delineated in two categories. That is they are separated by facility within the park and for each facility the costs are separated by discipline (architectural, civil/structural, electrical and mechanical). A summary of these estimates by facility consists of the following:

Cost Estimate Summary Table

	Architect	Civil/Struct	Electrical	Mechanical	Total Cost
Facility					
	154,700	177,400	83,800	69,400	485,300
Haloda Building					
Parking Lot adjacent to	NA	66,100	NA	NA	66,100
Haloda building					
	45,000	9,100	4,400	2,000	60,500
Asan Maintenance Complex					
	31,800	591,300	5,200	NA	628,300
Asan Point Beach Unit					
	NA	21,800	NA	NA	21,800
Apaca Point Beach Park					
	NA	46,200	NA	NA	46,200
Ga'an Point Beach Park					
	NA	29,500	NA	NA	29,500
Asan Point Overlook					
	NA	31,000	NA	NA	31,000
Piti Guns					
	NA	25,700	NA	NA	25,700
Fonte Plateau					
	NA	27,200	NA	NA	27,200
Vehicles					
	231,500	1,025,300	93,400	71,400	1,421,600
Total Costs					

NA = cost not applicable for this category

Detailed cost estimates are attached

Associated Costs

Other costs associated with the storm damage, incurred directly by NPS consist of, but are not limited to the following; debris cleanup, packing, moving and storage, rental space, building security, miscellaneous damaged items, cleaning, testing, servicing, repair and/or replacement of equipment (this applies to shop equipment and electrical equipment), post typhoon increased communication costs, and additional labor. These costs are not quantified within the scope of this report. However, other costs associated with the Additional Observations are shown below:

Item	Location	Cost
1.0 ADA compliance	Haloda Building	Four (4) levels/ 5 passengers
(elevator)		lump sum of \$50,000
2.1 Remove & replace all	Haloda Building	Ceiling, wall, carpet; \$25,000
interior partitions		
2.2 Interior mold, mildew &	Haloda Building	Two (2) floors x \$15,000 per
fungus remediation		floor = \$45,000 (#1)
2.3 New Museum Displays	Haloda Building	Lump Sum @ \$50,000
and climate controlled storage		
3.0 New storm shutters for all	Haloda Building	Front; 806sf :Rear; 2944sf =
exterior doors and windows		3,750 sf x 20/sf = \$75,000
4.0 Elastomeric roof coating	Haloda Building	6800 sf x 3.00/sf = 20,400
with insulation		
5.0 New electrical building	Haloda Building	Bldg: 240 sf x 50/sf= \$12,000
with generator		Genset: 500KW \$25,000
6.0 New work space to	Maintenance Facility	500 sf x \$80/sf = \$40,000
replace office trailer		
7.0 New fuel tanks	Maintenance Facility	3,000 gal gasoline \$4,000
		1,000 gal diesel \$2,000

#1) This price does not include preservation/restoration work on any part of the museum collection.

Note that these items are not all inclusive to the extent of improvements that could be made and/or may be contemplated by the National Park Service.

Restoration work on the Park monuments and conservator's work on the bronze plaques, memorial name lists and relief sculptures are not included.

The detailed cost estimates, WAPA site map, and appendix with photos follow.



		WINZI	ER	SI	KELL	Y	
		C O N S U L T	ING	E N G	INEER	s	
roject	· HAI OI	DA BUILDING			Date:		January 200
							
ocation		Harris Barrella Control	0	11.24		tiona	al Park Servic
Item No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost		Total Cost
		CIVIL/STRUCTURAL WORKS					***************************************
1		REPLACE DAMAGE PARKING LOT (60'x160')					0.00
		CLEANUP AND DISPOSAL	1,067	SY	5.00		5,333.33
a b		6" THICK BASE COURSE	1,067	SY	12.00		12,800.00
C C		6" THICK CONCRETE PAVEMENT	1,067	SY	45.00		48,000.00
C		O THICK CONCILETATEMENT	1,007	01	43.00		40,000.00
IVIL S	UB TOT	AL COST				•	66,133.33
2		REPAIR CMU WALL ENCLOSURE (7'x20')					
<u>-</u> а		CLEANUP/DISPOSAL	140	SF	5.00		700.00
b		8" CMU WALL	140	SF	10.00	· · · · · · · · · · · · · · · · · · ·	1,400.00
c	***************************************	PLASTERING	140	SF	2.00		280.00
d		PAINTING	280	SF	1.50		420.00
•		CRACK AND SPALLING REPAIR					
3		COLUMN CRACK REPAIR	20	LF	35.00		700.00
a			200				700.00
b	,	SPALLING REPAIR CHIPPING/SANDBLAST RUSTED REBAR	200	SF	18.00		3,600.00
		EPOXY PRIMING OF REBAR					
		PLASTERING WITH STAPLE REINFORCEMENT					***************************************
		FLASTERING WITH STAFLE REINI ORCEWENT					
4		REPAIR SECURITY GATE	1	EA	1,500.00		1,500.00
5		DRAINAGE SYSTEM REPAIR AND UPGRADE CLEANUP/DISPOSAL OF DEBRIS	1	LS	2 500 00		2 500 00
a b	,	UPGRADE DRAINAGE SYSTEM	1	LS	2,500.00 15,000.00		2,500.00 15,000.00
U		OF GRADE DIVARIAGE STSTEM		LO	13,000.00		13,000.00
6		CONSTRUCT SEAWALL (200'-250')					
а		FOUNDATION EXCAVATION	167	CY	20.00		3,340.00
b		CONCRETE FOUNDATION	111	CY	300.00		33,300.00
С		CONCRETE WALL	148	CY	400.00		59,200.00
d		BOULDERS FILL WITH CEMENT MORTAR	222	CY	250.00		55,500.00
		STRUCTURAL SUB TOTAL COST				\$	177,440.00
		TOTAL COST				\$	243,573.3

	I	TYPHOON DA	MAGE COST	ESTIMA	TE	
roject	l: HALOI	DA BUILDING-ARCHITECTURAL			Date:	January 200
ocatio	n:				Client: Natio	onal Park Service
Item No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost	Total Cost
		ARCHITECTURAL				
1		Remove exist. Paint/prep wall surfaces	24000	SF	1.00	24,000.00
2		Waterblasting/clean building.	1	LS	800.00	800.00
3		General celaning/removing debris	1	LS	1,000.00	1,000.00
4		Replace gate at basement	1	LS	2,000.00	2,000.00
5		Replace display casework	1	LS	50,000.00	50,000.00
6		Joint sealant	1	LS	500.00	500.00
7		Repalce weather strip	6	DR	50.00	300.00
8		Repalce exterior soffit ceiling	1200	SF	15.00	18,000.00
9		Replace 1st floor ceiling	4000	SF	3.00	12,000.00
10		Replace acoustical ceiling	2000	SF	1.20	2,400.00
11		Replace rubber base	1200	LF	1.30	1,560.00
12		Replace carpet	6000	SF	2.70	16,200.00
13		Painting-interior	12000	SF	0.45	5,400.00
14		Painting-exterior	12000	SF	0.50	6,000.00
15		Painting-misc.	1	LS	3,000.00	3,000.00
16		Replace exterior sign	1	LS	3,500.00	3,500.00
17		Replace canvas canopy	1	LS	8,000.00	8,000.00

		TYPHOON D	AMAGE COST	ESTIMA	TE	
Projec	t: ELEC1	IRICAL COST ESTIMATE			Date:	January 200
.ocatio					Client: Na	tional Park Servic
Item No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost	Total Cost
Α		HALODA BUILDING-ELECTRICAL				
1		Interior feeder wiring	1	ls	3,500.00	3,500.0
2		Distribution panelboards	1	ls	7,500.00	7,500.0
3		Replace service entrance	1	ls	14,000.00	14,000.0
4		Emergency power system	1	ls		58,800.0
		SUB TOTAL COST				\$ 83,800.0
В		ASAN MAINTENANCE COMPLEX				
1		New trailer panel	1	ls	900.00	900.0
2		New trailer feeder	1	ls	1,250.00	1,250.0
3		Clean/Test/Repair light fixtures	1	ls	970.00	970.0
4		Clean/Test Security System	1	ls	1,300.00	1,300.0
		SUB TOTAL COST				\$ 4,420.0
С		ASAN POINT BEACH UNIT				
1		New flagpole monument lights	1	ls	1,200.00	1,200.0
2		Lighting feeder	1	ls	4,000.00	4,000.0
		SUBTOTAL COST				\$ 5,200.0
0-		OTAL COST	1			\$ 93,420.0

		TYPHOON DAMAG	SE COST	ESTIMA	TE	
roject	t: MECH	ANICAL COST ESTIMATE			Date:	January 200
ocatio					Client: Nat	ional Park Servic
Item No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost	Total Cost
Α		HALODA BUILDING-MECHANICAL				
1		Replace condensing units incl. Refrigerant piping	2	ea	32,660.00	65,320.0
2		Reconnect 4" downspouts	2	ea	110.00	220.0
3		Repalce toilet exhaust fans	1	ea	410.00	410.0
4		Replace exhaust registers	2	ea	66.00	132.0
5		Re-insulate ductwork	1,600	sf	2.10	3,360.0
		SUB TOTAL COST				\$ 69,442.0
В		ASAN MAINTENANCE COMPLEX				
1		Replace roof ventilators	2	ea	855.00	1,710.0
2		Reconnect trailer office plumbing	1	lot	220.00	220.0
		SUB TOTAL				\$ 1,930.0

	I	TYPHOON DA	AMAGE COST	ESTIMA	TE	
roiect	t: ASAN	POINT BEACH UNIT AND CS-ARCHI	TECTURAL		Date:	January 200
catio						onal Park Servic
ltem No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost	Total Cost
		ARCHITECTURAL				
1		Remove exist. Paint/prep wall surface	4000	SF	1.00	4,000.00
2		Waterblasting/clean building	4000	LS	200.00	200.00
3		General cleaning/removing debris	1	LS	100.00	100.00
4		Replace granite veneer	500	SF	50.00	25,000.0
5		Painting	4000	SF	0.50	2,000.0
6		painting-miscellaneous	1	LS	500.00	500.0

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Remove exist. Paint/prep wall surfaces Waterblasting/clean building. General celaning/removing debris Repair glassblocks joint with sealant Repair wood mezzanine floor Repair roofing membrane Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet Painting-interior	2500 200 11 250 200 200 300 6000	SF LS SF LS SF LS PR EA DR LF SF	1.00 800.00 300.00 1,000.00 500.00 500.00 50.00 1.30 2.70	January 200 ional Park Servic Total Cost 11,000.00 800.00 300.00 2,500.00 1,000.00 4,000.00 500.00 1,000.00 2,000.00 150.00 260.00 810.00
Remove exist. Paint/prep wall surfaces Waterblasting/clean building. General celaning/removing debris Repair glassblocks joint with sealant Repair wood mezzanine floor Repair roofing membrane Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	11000 1 1 250 1 2500 200 1 2 4 3 200 300	SF LS SF LS SF LS PR EA DR LF SF	1.00 800.00 300.00 10.00 1,000.00 5.00 500.00 500.00 500.00 50.00 1.30	11,000.00 800.00 300.00 2,500.00 1,000.00 4,000.00 500.00 2,000.00 150.00 260.00
Remove exist. Paint/prep wall surfaces Waterblasting/clean building. General celaning/removing debris Repair glassblocks joint with sealant Repair wood mezzanine floor Repair roofing membrane Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	11000 1 1 250 1 2500 200 1 2 4 3 200 300	SF LS SF LS SF LS PR EA DR LF SF	1.00 800.00 300.00 10.00 1,000.00 5.00 500.00 500.00 500.00 50.00 1.30	11,000.00 800.00 300.00 2,500.00 1,000.00 4,000.00 500.00 2,000.00 150.00 260.00
Remove exist. Paint/prep wall surfaces Waterblasting/clean building. General celaning/removing debris Repair glassblocks joint with sealant Repair wood mezzanine floor Repair roofing membrane Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	1 1 250 250 200 200 1 2 4 3 200 300	LS LS SF LS SF LS PR EA DR LF SF	800.00 300.00 10.00 1,000.00 5.00 20.00 500.00 500.00 50.00 1.30	800.00 300.00 2,500.00 1,000.00 12,500.00 4,000.00 500.00 1,000.00 2,000.00 150.00
Waterblasting/clean building. General celaning/removing debris Repair glassblocks joint with sealant Repair wood mezzanine floor Repair roofing membrane Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	1 1 250 250 200 200 1 2 4 3 200 300	LS LS SF LS SF LS PR EA DR LF SF	800.00 300.00 10.00 1,000.00 5.00 20.00 500.00 500.00 50.00 1.30	800.00 300.00 2,500.00 1,000.00 12,500.00 4,000.00 500.00 1,000.00 2,000.00 150.00
Waterblasting/clean building. General celaning/removing debris Repair glassblocks joint with sealant Repair wood mezzanine floor Repair roofing membrane Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	1 1 250 250 200 200 1 2 4 3 200 300	LS LS SF LS SF LS PR EA DR LF SF	800.00 300.00 10.00 1,000.00 5.00 20.00 500.00 500.00 50.00 1.30	800.00 300.00 2,500.00 1,000.00 12,500.00 4,000.00 500.00 1,000.00 2,000.00 150.00
General celaning/removing debris Repair glassblocks joint with sealant Repair wood mezzanine floor Repair roofing membrane Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	1 250 2500 200 200 1 2 4 3 200 300	LS SF LS SF LS PR EA DR LF SF	300.00 10.00 1,000.00 5.00 20.00 500.00 500.00 50.00 1.30	300.00 2,500.00 1,000.00 12,500.00 4,000.00 500.00 1,000.00 2,000.00 150.00 260.00
Repair glassblocks joint with sealant Repair wood mezzanine floor Repair roofing membrane Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	250 1 2500 200 1 2 4 3 200 300	SF LS SF LS PR EA DR LF SF	10.00 1,000.00 5.00 20.00 500.00 500.00 500.00 50.00 1.30	2,500.0 1,000.0 12,500.0 4,000.0 500.0 1,000.0 2,000.0 150.0 260.0
Repair wood mezzanine floor Repair roofing membrane Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	1 2500 200 1 2 4 3 200 300	LS SF LS PR EA DR LF SF	1,000.00 5.00 20.00 500.00 500.00 500.00 50.00 1.30	1,000.0 12,500.0 4,000.0 500.0 1,000.0 2,000.0 150.0 260.0
Repair roofing membrane Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	2500 200 1 2 4 3 200 300	SF LS PR EA DR LF SF	5.00 20.00 500.00 500.00 500.00 50.00 1.30	12,500.0 4,000.0 500.0 1,000.0 2,000.0 150.0 260.0
Repair flashing and coping Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	200 1 2 4 3 200 300	LS PR EA DR LF SF	20.00 500.00 500.00 500.00 50.00 1.30	4,000.0 500.0 1,000.0 2,000.0 150.0 260.0
Joint sealant Replace HM doors and hardware Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	1 2 4 3 200 300	PR EA DR LF SF SF	500.00 500.00 50.00 1.30	500.0 1,000.0 2,000.0 150.0 260.0
Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	4 3 200 300	DR LF SF SF	500.00 50.00 1.30	2,000.0 150.0 260.0
Repair/service roll-up service door Repalce weathyer strip Replace rubber base Carpet	3 200 300	LF SF SF	50.00 1.30	2,000.0 150.0 260.0
Replace rubber base Carpet	200 300	SF SF	1.30	260.0
Carpet	300	SF		
			2.70	810.0
Painting-interior	6000			
		SF	0.45	2,700.0
Painting-exterior	5,000	ls	0.50	2,500.0
Painting-misc.	1	ls	3,000.00	3,000.0

		CONSULTI		GINE	ERS	
		TYPHOON DAMA	GE COST EST	IMATE		***************************************
Project:	VEHICLI	E DAMAGE			Date:	January 200
ocation:	<u> </u>				Client: Natio	nal Park Service
Item No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost	Total Cost
		REAPAIR COST				
1		WHITE FORD PASS VAN, SIDE DOOR WINDOW	2	EA	2,500.00	5,000.00
		, , , , , , , , , , , , , , , , , , , ,	_		1,500.00	
2		JOHN DEEREE 970 TRACTOR, FRONT	2	EA	3,000.00	6,000.00
		CHASIS COVER				
3		DUMP TRUCK HYDRAULIC TAIL GATE	1	EA	1,500.00	1,500.00
4		CASE 580 BACKHOE	1	LS		
а		LEFT DOOR	1	EA	1,500.00	1,500.00
b		RIGHT WINDOW	1	EA	700.00	700.00
5		JOHN DEERE 5400 TRACTOR MOWER	1	EA	4,500.00	4,500.00
		LT SIDE CUTTER OUTRIGGER				
6		DODGE RAM 3500 FLATBED				
а		HOOD AND ROOF PAINT STIPPED	1	LS	3,000.00	3,000.00
b		DAMAGE TO LIFT GATE	1	LS	5000	\$ 5,000.00

		TYPHOON	ZLER & E N DAMAGE COST EST	IMATE	L	
		PLATEAU			Date:	January 200
_ocation:					Client: Natio	nal Park Service
Item No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost	Total Cost
		CIVIL/STRUCTURAL WORKS				
1		ADD BOLLARDS	10	EA	500.00	5,000.00
2		ADD WHEEL STOPS	20	EA	50.00	1,000.00
3		PAVE PARKING AREA (60'x100')	1	LS	2,000.00	2,000.00
a	1	6" THICK BASE COURSE	222	SY	12.00	2,664.00
<u> </u>		6" THICK PCC PAVEMENT	222	SY	45.00	9,990.00
4		CLEAN AND PAINT BUNKER	1	LS	5,000.00	5,000.00

		C O N S U L T	ING EN	GINE	ERS	
	1	TYPHOON DAMA				
roject:	PITI GUI	NS			Date:	January 200
ocation:					Client: Natio	nal Park Servic
Item No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost	Total Cost
		CIVIL/STRUCTURAL WORKS				
1		DEBRIS CLEANUP/REMOVE DOWNED TREES	1	LS	5,000.00	5,000.00
2		REPOSITION GUN INTO PEDESTAL	1	LS	12,000.00	12,000.00
		(jacking,cribbing,new foundation & repositioning)				
3		REPAINT METAL SURFACES	1	LS	2,000.00	2,000.00
4		REPLACE STAIR HANDRAILS	300	LF	40.00	12,000.00

	1	C O N S U L TYPHOON DAM	IAGE COST ES	TIMATE		
		OINT OVERLOOK			Date:	January 200
ocation						nal Park Servic
Item No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost	Total Cost
		CIVIL/STRUCTURAL WORKS				
1		STOP SIGN AND POST	2	EA	500.00	1,000.0
2		REATTACH NPS LOGO	2	EA	200.00	400.0
3		SPACES BLOCKS SQUARE METAL TUBE	80	EA	50.00	4,000.0
4		HANDICAPPED SIGN & POST	3	EA	700.00	2,100.0
5		CLEAN DEBRIS	1	LS	1,500.00	1,500.0
6		REPLACE SIGN	1	EA	2,500.00	2,500.0
7		REFINISH PLAQUES	1	LS	15,000.00	15,000.0
8		REPLACE RETAINING WALL	1	LS	1,000.00	1,000.0
9		REPLACE TREES & SHRUBS/LANDSCAPE	1	LS	2,000.00	2,000.0

		CONSULTING ENGINEERS TYPHOON DAMAGE COST ESTIMATE				
	O A A NI B					
-	GAAN P	OIN I			Date:	January 20
cation:			0 (1)		· ·	nal Park Servi
Item No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost	Total Cost
110.	Jection	CIVIL/STRUCTURAL WORKS				
1		CLEANUP AND DISPOSAL	1	LS	5,000.00	5,000.0
2		REPLACE PICNIC BENCH AND SHADE				
a		REPLACE WOOD BENCH	1	LS	1,500.00	1,500.0
b b		REPLACE WOOD BENCH	1	LS	5,000.00	5,000.0
~					5,000.00	3,000.
3		UPGRADE DRAINAGE DITCH (20x200')	4,000	SF	2.00	8,000.
4		REPLACE SIGN POST	2	EA	500.00	1,000.0
5		REPLACE FLAGPOLES	3	EA	2,500.00	7,500.
6		REPLACE ASHALP WALKWAY WITH CONC	333	SY		
а		6" THICK BASE COURSE	333	SY	12.00	3,996.
b		4" THICK PCC PAVEMENT	333	SY	35.00	11,655.
7		REPLACE/REPAINT CONC. BOLLARDS				
а		REPLACE CONCRETE BOLLARD	1	EA	500.00	500.
b		REPAINT CONCRETE BOLLARDS	100	EA	10.00	1,000.
8		REPLACE CORAL DRIVEWAY (2EA-10'x30')	67	SY	15.00	1,005.

		C O N S U L				
roject:	APACA	POINT			Date:	January 200
ocation:	£				Client: Natio	nal Park Servic
Item No.	Specs. Section	Item Description	Quantity	Unit	Unit Cost	Total Cost
		CIVIL/STRUCTURAL WORKS				
1		DEBRIS CLEANUP AND DISPOSAL	1	LS	5,000.00	5,000.00
		DEDI A DE DIQUIA DENOU AND QUADE				
2		REPLACE PICNIC BENCH AND SHADE			4 500 00	4.500.0
		REPLACE WOODEN STRUCTURE SHARE	1	LS	1,500.00	1,500.00
t	0	REPLACE WOODEN STRUCTURE SHADE	1	LS	5,000.00	5,000.0
3		UPGRADE DRAINAGE DITCH	1	LS	5,000.00	5,000.00
		OF GRADE DIVARIAGE DITOR		LO	3,000.00	3,000.0
4		REPAIR/REPLACE METAL SIGN				
a	3	REPAIR METAL SIGN 36"X60")	1	EA	800.00	800.0
b	· · · · · · · · · · · · · · · · · · ·	REPLACE METAL SIGN	1	EA	2,400.00	2,400.0
,						0.0
5		REPAINT CONCRETE BOLLARDS	1	LS	2,000.00	2,000.0
a	Э	PRESSURE WASHER	1	day	150.00	150.0
		(surfaces: slabs, tables, etc.)				
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TYPHOON DAMAGE COST ESTIMATE

oject:	ASAN P	OINT BEACH UNIT		l	Date:	January 2003
cation:	***************************************				Client: Natio	nal Park Service
ltem		Item Description	Quantity	Unit	Unit Cost	Total Cost
No.	Section					
		CIVIL/STRUCTURAL WORKS				
1		REPLACE ENTRANCE GATE (3'x20')	1	EA	1,200.00	1,200.00
		RESTORE BOMB ON CONC. PEDESTAL	4		1 500 00	1 500 00
2		RESTORE BUMB ON CONC. PEDESTAL	1	EA	1,500.00	1,500.00 0.00
3		RESTORE PCC SIDEWALK PAVEMENT (12'x30')	360	SF	7.00	2,520.00
3		RESTORE FCC SIDEWALK PAVEINENT (12 x30)	300	SF	7.00	2,320.00
4		REPLACE AC PAVEMENT PARKING LOT				
a a		CLEANUP AND DISPOSAL	1	LS	3,500.00	3,500.00
b		6" THICK BASE COURSE	6,910	SY	12.00	82,920.00
С		6" THICK PCC PAVEMENT	6,910	SY	45.00	310,950.00
d		RESTORE CONC. WHEEL STOP	50	EΑ	50.00	2,500.00
е	***************************************	PAVEMENT MARKINGS	1	LS	1,200.00	1,200.00
f		PAINT BOLLARDS	200	EA		
5		REPLACE WALKING PATHWAY				
а		CLEANUP AND DISPOSAL	1	LS	1,500.00	1,500.00
b	•	6" THICK BASE COURSE	4,000	SF	1.50	6,000.00
С		4" THICK PCC WALKWAY	4,000	SF	7.00	28,000.00
						0.00
6		REPAIR PARK FURNITURES			500.00	0.00
a		BBQ PIT	5	EA	500.00	2,500.00
b		TABLE S	4	EA	500.00	2,000.00
c d		BENCHES SIGN 2'x2'	2	EA EA	750.00 700.00	3,000.00 1,400.00
ū		SIGN 4'x6'	2	EA	1,500.00	3,000.00
		31311 4 X0		LA	1,300.00	0.00
7		REPLACE COCONUT TREES	200	EA	200.00	40,000.00
		REI LAGE GOGORGI TREEG	200		200.00	40,000.00
8		RESTORE EMBANKMENT WITH IMPORTED FILL	1,480	CY	28.00	41,440.00
			,			
9		REVETMENT RESTORATION	555	CY	50.00	27,750.00
10		REPAINT CONCRETE BOLLARDS	400	EA	25	10,000.00
11		RENTAL EQUIPMENT FOR CLEANUP				
а		BOBCAT	3	MO	3000	9,000.00
b		OPERATOR	3	MO	1950	5,850.00
С		BACKHOE REPAIR	1	EA	600	600.00
d		OPERATOR	30	DAY	50	1,500.00
е		DUMP TRUCK	30	DAY	50	1,500.00

591,330.00

Grand Total

	J	TYPHOON DAMA				
oiect:	ASAN M	IAINTENANCE COMPLEX			Date:	January 200
cation:						nal Park Servic
Item	Specs.	Item Description	Quantity	Unit	Unit Cost	Total Cost
No.	Section	nom Becompacti	Quantity	O.me	Omit Goot	70147 0001
		CIVIL/STRUCTURAL WORKS				
1		OFFICE TRAILER FOUNDATION				
а		FOOTING	1	LS	2,000.00	2,000.0
b		DEADMAN ANCHOR	4	EA	600.00	2,400.0
С		TIE DOWN CABLES	60	LF	4.00	240.0
d		TURN BUCKLES	4	EA	100.00	400.0
е		EQUIPMENT(CRANE)	8	HR	150.00	1,200.0
2		REPAIR CHAINLINK FENCE AND GATE			4 500 00	4
a		REPLACE 15 FT CHAINLINK GATE REPLACE BENT TOP RAIL AND POST	1 1 1 1 1 1 1	EA	1,500.00	1,500.0
b	-	REALGN MAIN SLIDING GATE	150 1	LF EA	10.00 300.00	1,500.0 300.0
C		REALGN WAIN SLIDING GATE	1	EA	300.00	300.0
3		PATCH ASPHALT ACCESS ROAD (20'x10')	22	SY	35.00	770.0
4		MECHANICAL REPAIR				
а		REPLACE A/C UNIT	1	EA	5,000.00	5,000.0
5		ROLL UP DOORS SERVICE ONLY	5	EA	500.00	2,500.0
6		INTERIOR DOORS(HOLLOW METAL)	1	EA	900.00	900.0

WAPA SITE MAP, TYPHOON IMAGERY AND RELATED INFORMATION